

REMARKS

As a preliminary matter, claims 16, 33, 38 and 43-46 stand rejected under 35 U.S.C. §112(1). Claims 16, 33, and 38 are rejected for reciting the limitation “rate of crosslinking”. In response, Applicants amended “rate of crosslinking” to “bonding ratio”. Further, claims 16, 33 and 38 are rejected for reciting a lower range of crosslinking of “85% or more”. To address this rejection, Applicants amended the claims to recite a lower range of “about 85.5% or more”. Support for this amendment can be found in Table 1 in the specification. Further still, claim 43 is rejected for reciting a lower range of contact angle of “115 degrees or more”. Referring to table I of the specification, Applicants amended claim 43 to recite “about 116 degrees or more”. Finally, claims 44-46 are rejected for reciting an upper range of lubricating layer thickness of “2.5nm or less”. Applicants traverse this rejection because the thickness of 2.5 nm is described on page 53, line 36 of the specification. With these amendments, Applicants submit that the foregoing ground of rejection of claims 16, 33, 38 and 43-46 is traversed, and request withdrawal.

Claims 16, 18, 19, 32, 35-40, 42-49 stand rejected under 35 U.S.C. §102(e) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Stirniman et al. U.S. 6,589,641. Claim 33 was rejected under §112, but not §103. In any event, arguments for the allowability of claims 16 and 38 are applicable to claim 33.

The rejections of independent claims 16 and 38 will be addressed together. Applicants traverse the rejections of independent claims 16 and 38 because the cited references do not disclose or suggest the feature of using an Xe₂ excimer lamp, in

combination with the use of ambient containing oxygen with a concentration of 10ppm or less, as in the amended independent claims. The use of the excimer lamp is disclosed in the specification on page 37, lines 1-15.

In the present invention, a Xe₂ excimer lamp is used to photocrosslink the lubricating layer because a Xe₂ excimer lamp provides efficient photocrosslinking. However, use of the Xe₂ excimer lamp results in increased absorption of the optical radiation by the oxygen. To avoid the problem of absorption of the optical energy, the Xe₂ excimer lamp is used in combination with an ambient containing oxygen with a concentration of 10ppm or less. When the oxygen content is suppressed, the optical energy is not absorbed by the oxygen, and an improvement in bonding ratio of the lubrication film occurs.

Stirniman et al. merely teach the use of ultraviolet radiation. Since there is no teaching or suggestion of combining the Xe₂ excimer radiation and the oxygen concentration of 10ppm or less to improve the bonding ratio, Applicants submit the rejections of claims 16 and 38 are traversed.

In addition to the foregoing with respect to amended claim 33, Stirniman et al. do not disclose or suggest the feature of a carbon film having a thickness of 8nm or less. In the present invention, using a carbon film having a thickness of 8nm or less as a protective film, the magnetic spacing (as set forth on page 48, line 27) can be reduced. When a lubrication film is formed on the protective carbon film by photocrosslinking, it becomes possible to obtain a lubrication film of the desired bonding ratio as shown in Table 1 in the short period of time as set forth on page 39, line 15 of the specification. This is done by

increasing the number of photoelectrons formed from the protective carbon film by use of a short wavelength radiation, specifically by using a Xe₂ excimer lamp. The Xe₂ excimer lamp enhances the photoelectron effect with the protective carbon film.

With respect to claim 38, in addition to the foregoing, Applicants submit that Stirniman et al. do not disclose or suggest dipping the lubricating layer in a solvent. Dipping the lubricating layer in a solvent removes the portion of the lubrication film that is not photocrosslinked. Specifically, when using a Xe₂ excimer lamp, a surface state in which a part of the lubricating film does not contribute to the crosslinking reaction is formed. This portion of the lubricating film is selectively removed. Since Stirniman does not disclose or suggest dipping the lubricating layer in a solvent, Applicants submit that the rejection of claim 38 is traversed.

Claims 16, 18, 19, 32, 35-40, 42-49 stand rejected under 35 U.S.C. §103 as unpatentable over Stirniman et al. in view of Burgette et al., U.S. 4,705,699. The Burgette et al. reference is cited for teaching that photopolymerization of coatings should take place in an oxygen free environment. However, Burgette et al. does not disclose or suggest the features of the present invention, specifically, using an Xe₂ excimer lamp, in combination with the use of the ambient containing oxygen with a concentration of 10ppm or less, as in the amended independent claims.

Moreover, Burgette et al. is directed to photopolymerizing, while the present invention is directed to photocrosslinking. These are two different types of photochemical reactions. In the highly specialized field of photochemistry, what is beneficial for one

photoreaction is not necessarily beneficial, and can even be prohibitive, for another photoreaction. In a paper published in 2001 entitled "Effect of Photopolymerization on the Rate of Photocrosslink in Chalcone-based Oligomeric Compounds", it was found that photopolymerization actually retarded the photocrosslink of the oligomeric compounds under different intensities of light.¹ Thus, conditions that promote photopolymerization do not necessarily promote photocrosslinking. Likewise, the teaching of radiating a material in a vacuum to photopolymerize the material of Stirniman does not suggest radiating a material in an ambient having less than 10ppm of oxygen to photocrosslink the material. For these reasons, Applicants submit that Burgette et al. does not disclose or suggest the features of the present invention.

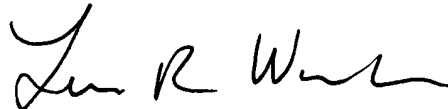
¹ Dong Hoon Choi et al., "Effect of Photopolymerization on the Rate of Photocrosslink in Chalcone-based Oligomeric Compounds", Bull. Korean Chem. Soc., 2001 Vol. 22, No. 11, page 1207-1212.

For the foregoing reasons, Applicants believe that this case is in condition for allowance, which is respectfully requested. The examiner should call applicants' attorney if an interview would expedite prosecution.

Respectfully submitted,

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